

BANISTERIA

A JOURNAL DEVOTED TO THE NATURAL HISTORY OF VIRGINIA



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Figures 81 and 49, respectively, in folio in Hans Sloane's MS 4002 in the British Museum of Natural History. Photographs courtesy of Joseph and Nesta Ewan.

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Number 44, 2014

Contributed Papers

- Habitat Selection of the Southern Flying Squirrel in the Virginia Piedmont
Todd S. Fredericksen, Jessica Banton, and Alison Davis 3
- The Longhorned Beetles (Insecta: Coleoptera: Cerambycidae) of the George Washington Memorial Parkway
Brent W. Steury and Ted C. MacRae 7
- Aquatic Snails (Gastropoda) from National Park Sites in Northern Virginia and Adjacent Maryland,
with an Updated Checklist of Regional Species
Brent W. Steury 13

Shorter Contributions

- A Collection of Shrews from Forests in Franklin County, Virginia
Todd S. Fredericksen, Anthony Garcia, and Cody Davis 19
- Compass Orientation of an Incubating and Brooding Ruby-throated Hummingbird (*Archilochus colubris*)
Gary R. Graves 21
- Noteworthy Beetle Records from Virginia, Maryland, and the District of Columbia (Coleoptera: Carabidae
and Chrysomelidae)
Brent W. Steury, Peter W. Messer, and Joseph F. Cavey 23

Miscellanea

- Reviews..... 26
- A Natural History of the Central Appalachians
- Reports..... 26
- Announcements..... 28

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Habitat Selection of the Southern Flying Squirrel in the Virginia Piedmont

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ABSTRACT

Southern Flying Squirrels (*Glaucomys volans*) were trapped from June-October 2013 at three mature forest sites dominated by hardwood trees in southwestern Virginia to determine variability in capture rates among sites and to relate them to different habitat variables. Nineteen squirrels were captured in similar numbers at two sites, with no captures at the third site. The density of cavity trees was the most important variable related to capture success, along with the relative proportion of conifer tree basal area, the amount of downed coarse woody debris, and the density of hard mast-producing tree species. Capture success was negatively related to percent slope. This study indicates that Southern Flying Squirrels select habitat based on several variables and may not be a generalist species of mature forests.

Key words: *Glaucomys volans*, habitat selection, small mammals, Southern Flying Squirrel, Virginia.

INTRODUCTION

Southern Flying Squirrels (*Glaucomys volans*) occur throughout deciduous forests of Virginia. Earlier studies of this species described it as an opportunistic generalist (Madden, 1974; Muul, 1974). The Southern Flying Squirrel also occurs in residential areas surrounded by large trees (Linzey, 1998) and frequently takes advantage of bird feeders close to human residences (T. S. Fredericksen, pers. obs.). Habitat features shown to be important for this species include mature deciduous trees, cavity trees, proximity to water, mast-producing trees, higher shrub layer stem density, and a relatively sparse midstory (Sonenshine et al., 1979; Sonenshine & Levy, 1981; Bendel & Gates, 1987; Fridell & Litvaitis, 1991; Merritt et al., 2001). While many forest stands have these conditions in southern Virginia and the species is considered common throughout the state (Linzey, 1998), we have observed that Southern Flying Squirrel populations are highly variable in different forest stands. For example, one forest stand on the campus of Ferrum College has a large population of this species with frequent captures over a series of years. The stand is dominated by Chestnut Oak (*Quercus montana*), Red Maple (*Acer rubrum*), and White Pine (*Pinus strobus*) and is located near a small pond. Trapping in other similar stands in forests at Ferrum College yielded only a few or no

captures (T. S. Fredericksen, unpub. data). In a three-year study by Shively et al. (2006) that included nine mature forest stands in Franklin, Patrick, and Henry counties, the Southern Flying Squirrel was only captured in one stand. There also appears to be a seasonal effect of capture success related to the activity of flying squirrels near the ground. In past years, we observed a particularly high number of captures in this stand during the fall when oak (*Quercus* spp.) and hickory (*Carya* spp.) nuts were on the ground, perhaps because squirrels were more actively foraging on the ground where traps were located. Other studies have shown more activity of squirrels in forests during periods of hard mast availability (Taulman & Smith, 2004).

The objectives of this study were to compare the relative abundance of Southern Flying Squirrels at mature forest sites with different habitats within sites and relate the number of new captures to an array of habitat variables hypothesized to be important for this species.

METHODS

The study was conducted at two sites on the campus of Ferrum College in Franklin County (Chapman Pond and Moonshine Creek), Virginia and another site on private property approximately one mile from the

College (Rambling Rose). All trapping sites contained mature (>70-year-old) mixed pine-hardwood forests with the canopy dominated by oaks (*Quercus* spp.), Red Maple, Tuliptree (*Liriodendron tulipifera*), and White Pine, and each had been subjected to light selective logging approximately 30 years earlier. The Chapman Pond site was situated on a low ridge with relatively flat topography. The Moonshine Creek site was on a moderate (2-10%) slope with an east-facing aspect, and the Rambling Rose site had variable aspects and slopes (0-10%).

At each site, we established six trapping locations that differed in topographic variables, such as slope and aspect and the amount of ground cover, shrub cover, midstory tree cover, hard mast tree density, and the amount of coarse woody debris on the forest floor. Some of the variability in vegetation cover and coarse woody debris was due to experimental forestry treatments that were conducted at each site within the previous 1-3 years.

We trapped each of the 18 locations three times from late June to early October for three consecutive nights. During each sampling period, we trapped at each location within one of the three sites in consecutive weeks. Sixty Sherman live traps were located within each site, with 10 traps at each trapping location. Total trapping effort per site was therefore 90 trap-nights (3 trapping periods x 3 nights x 10 traps).

Traps were placed in pairs, with the pairs located approximately 5 m from the center of the trapping site in a circular arrangement. One trap in each pair was placed on a wooden shelf attached by nails to a tree approximately 2 m above the ground and the other trap was placed on the ground. Similar to Risch & Brady (1996), we found from previous experience that placing traps on the boles of trees, as well as on the ground, increases trapping success. Above-ground traps were secured to the shelf using duct tape. Traps were baited with peanut butter, oats, and sunflower seeds.

Captured animals were ear-tagged, weighed, and immediately released. An attempt was made to follow the squirrels back to their cavity tree. If a cavity tree

was located, the species, diameter-at-breast-height (DBH), and total height (estimated with a clinometer), as well as the distance to trapping location, were recorded.

At all trapping locations, we conducted a habitat analysis using the 5 trapping points as sampling sites. At each sampling point, we collected habitat data listed in Table 1. Data for each point were averaged over the five sampling points for each trapping location.

We compared trapping type (ground vs. platform) and trapping sites (Chapman Pond, Moonshine Creek, and Rambling Rose) for individual squirrel captures (excluding recaptures) using a chi-square test. In addition, we created models to examine the effect of quantitative habitat variables at each trapping location on individual captures using backwards stepwise multiple regression with $p < 0.15$ as a criterion for entry into the model. Models were ranked using Akaike's Information Criterion (AIC), as well as the final model from stepwise regression. Analyses were carried out using Systat 12 (Systat Inc., San Jose, CA).

RESULTS

Nineteen flying squirrels were captured during the study period, with eight recaptures recorded, for a total of 27 captures. Captured individuals included six males and ten females, plus three others that escaped before their sex could be determined. Significantly more captures occurred in traps on tree platforms than those placed on the ground ($X^2 = 11.84$, $p = 0.001$). Only two captures (7.4%) occurred in ground traps. Captures also significantly varied among sites ($X^2 = 7.58$, $p = 0.023$). Ten squirrels were captured at the Rambling Rose site and nine at the Chapman Pond site, but none at the Moonshine Creek site.

We followed seven squirrels from their trapping location to a tree cavity. Cavity trees included four Chestnut Oaks, one Scarlet Oak (*Quercus coccinea*), and two White Pine snags. Four of the seven trees were snags. Mean tree diameter at breast height was 19 cm (range 12-40) and mean tree height was 14 m (range 2-

Table 1. Habitat variables and sampling methods employed for comparison with captures of Southern Flying Squirrels in Franklin County, Virginia.

Variable	Method
Tree basal area (overall and by species)	10-factor prism count
Cavity tree density	# of trees in a 20 x 20 m plot
Snag density	# of trees in a 20 x 20 m plot
Percent overstory tree cover (≥ 10 m tall)	Canopy densitometer
Percent midstory tree cover (>2 m, but < 10 m tall)	Canopy densitometer
Percent shrub cover (0.5 – 2 m tall)	Ocular estimate 3 x 3 m plot
Percent herbaceous cover (< 0.5 m tall)	Ocular estimate 3 x 3 m plot
Downed coarse woody debris volume (> 10 cm wide)	Length and width of all logs within 10 x 10 m plot
Distance to water by water type (stream, pond)	Ground measurement or calculation from aerial photo

23). Cavities ranged from approximately 10-30 m from the trapping location. We were unable to determine if the cavities were those normally used by the squirrels or just ones opportunistically used for escape.

The model with the lowest AIC (82.6), corrected for small sample size, included a positive relationship with the number of cavity trees ($t = 3.52$, $p = 0.004$), conifer basal area ($t = 2.31$, $p = 0.04$), coarse woody debris ($t = 1.91$, $p = 0.081$), and mast tree basal area ($t = 1.65$, $p = 0.13$). It also included a negative relationship with percent slope ($t = -2.83$, $p = 0.015$). The location with the highest capture success had very little shrub cover (7%) or midstory cover (15%), but the site with the second highest capture success had both high shrub cover (62%) and midstory cover (58%), with a particularly high density of Mountain Laurel (*Kalmia latifolia*). Both sites with the highest captures were dominated by hard mast trees, particularly Chestnut Oak, Scarlet Oak, and White Oak.

DISCUSSION

Despite reportedly being common in mature forests throughout Virginia (Linzey 1998), we observed high variability in capture rates for Southern Flying Squirrels in our study area. We captured squirrels at only two of three study sites, and at one site (Chapman Pond), eight of nine squirrels were captured at the same trapping location. It is unclear why squirrels were not captured at the Moonshine Creek site because it appeared to be similar to the other two sites and apparently contained suitable habitat. Past studies conducted on the Ferrum College campus (T. S. Fredericksen, unpub. data) have had highly sporadic trapping success among sites and Shively et al. (2006) captured Southern Flying Squirrels at only one of nine mature forest sites in a three-county area over a three-year period. Taulman & Smith (2004) concluded, however, that Southern Flying Squirrels are fairly selective in their habitat use and are not forest generalists.

Habitat variables within mature forests have been shown to be related to the density of Southern Flying Squirrels. One important habitat requirement is the availability of cavities. Flying Squirrels will sometimes construct leaf nests, but prefer hollow stumps or tree cavities (Linzey, 1998). We found that the density of cavity trees was the most important habitat variable related to the number of flying squirrel captures in our study. Older forests may perhaps be preferred habitat for flying squirrels because they are more likely to have decay that results in more cavities (Holloway & Malcolm, 2007). We found that squirrels used cavities in both oak and pine trees. Tree height or condition apparently did not affect cavity use because squirrels

used cavities in short (2 m) stumps of dead trees, as well as cavities on the boles of live trees.

Another habitat variable that was significant in this study was conifer basal area, with more squirrels tending to be captured in stands with a higher conifer component. White Pine was the dominant conifer species on the study sites, although Virginia Pine (*Pinus virginiana*) was also common. It should be noted, however, that all stands in this study were dominated by hardwoods. A study in Arkansas also noted that the Southern Flying Squirrel preferred mature pine-hardwood forests, rather than pure hardwood forests or pine plantations (Taulman, 1999; Taulman & Smith, 2004). Pine seeds are an additional food source for flying squirrels (Linzey, 1998) and Taulman (1999) found that pines were used more frequently for outside nests than hardwood trees.

Downed coarse woody debris was another habitat variable that was related to capture rates. Our study had a wide range of coarse woody debris volumes because several sites included areas with timber stand improvement where poorly-formed trees were either felled and left on-site or felled and removed for firewood. Coarse woody debris may increase flying squirrel habitat quality for several reasons. First, it may be important cover that reduces predation risk during ground foraging, particularly in the late summer and fall when squirrels begin to store food for the winter. Second, coarse woody debris, particularly long logs, provides runways for small mammals, such as the flying squirrel, which facilitates ground travel and reduces noise that may attract predators (Loeb, 1989; McCay, 2000). Finally, coarse woody debris is invaded by insects and fungi which provide additional food sources for flying squirrels.

Another habitat variable identified as important in this study for flying squirrels was the abundance of hard mast-producing trees, such as oaks, hickories (*Carya* spp.) and American Beech (*Fagus grandifolia*). Most of the hard mast trees in the study area were oaks and the two sites with the highest captures had high densities of oaks. These species are particularly important food sources during the late summer and fall (Fridell & Litvaitis, 1991). In forests of central Ontario, Holloway & Malcolm (2007) found a close association between radio-locations of Southern Flying Squirrels and mast and decaying trees, probably because these factors provide both food and nesting sites. Interestingly, we found a negative relationship between squirrel captures and percent slope. This relationship may be an artifact related to the higher abundance of oaks and hickories on the flatter upland sites of the study area where there was high trapping success. Sonenshine et al. (1979) found no relationship between

Southern Flying Squirrel density and slope percentage.

Some other habitat variables that have been identified as important for the Southern Flying Squirrel that were not related to capture success in our study include shrub cover and midstory cover. Similar to coarse woody debris, understory shrub cover may provide cover for flying squirrels when foraging on the ground (Sonenshine & Levy, 1981; Bendel & Gates, 1987). Also, because gliding is a primary means of travel, an open midstory is thought to be important for the Southern Flying Squirrel (Bendel & Gates, 1987). Proximity to water (streams, pond) did not vary greatly in this study, but is another variable thought to be important for Southern Flying Squirrels (Sonenshine et al., 1979). The availability of cavity trees and other variables identified in this study may have offset the importance of these habitat variables.

In summary, Southern Flying Squirrel capture rates varied significantly between mature forest sites in this study and this species seems to be much more selective with respect to habitat conditions than previously believed. Habitat selection may depend on a mixture of habitat variables, but the availability of cavity trees appears to be the most important of these.

ACKNOWLEDGMENTS

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The Longhorned Beetles (Insecta: Coleoptera: Cerambycidae) of the George Washington Memorial Parkway

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ABSTRACT

Eighty species in 60 genera of cerambycid beetles were documented during a 17-year field survey of a national park (George Washington Memorial Parkway) that spans parts of Fairfax County, Virginia and Montgomery County, Maryland. Twelve species are documented for the first time from Virginia. The study increases the number of longhorned beetles known from the Potomac River Gorge to 101 species. Malaise traps and hand picking (from vegetation or at building lights) were the most successful capture methods employed during the survey. Periods of adult activity, based on dates of capture, are given for each species. Relative abundance is noted for each species based on the number of captures. Notes on plant foraging associations are noted for some species. Two species are considered adventive to North America.

Key words: Cerambycidae, Coleoptera, longhorned beetles, Maryland, national park, new state records, Potomac River Gorge, Virginia.

INTRODUCTION

The Cerambycidae, commonly known as longhorned beetles because of the length of their antennae, represent a large insect family of more than 20,000 described species, including 1,100 in North America north of Mexico and 344 in the northeastern United States (Yanega, 1996). They occur on all continents except Antarctica. Larvae of most cerambycids bore into trunks or branches of dead or dying trees and feed on decaying plant tissues between the bark and sapwood or within the sapwood creating a characteristic maze of feeding chambers. Some larvae feed on branches, roots, or stems of herbaceous species or even fruits or seeds of living plants. Adults of most species are large (up to 170 mm in length in some South American species) and can be easily observed in the field, but some are as small as 2 mm. Diurnal adults

that feed on flower pollen are usually boldly colored and patterned, often with a bee-like golden-yellow pubescence. Nocturnal species are more likely glabrous and uniformly dark, while bicolored species (often black and red) are thought to mimic other beetles which are distasteful. Others have cryptic, bark-like coloration. Some longhorned beetles can stridulate by rubbing the pronotum against adjacent posterior body parts. Nearly all cerambycids have antennae that arise from protuberances between and often deeply dividing the eyes and have tarsi with four visible segments. Many features are sexually dimorphic. Currently three species of longhorned beetles — *Anthophylax hoffmani* Beutenmüller, *Dryobius sexnotatus* Linsley, and *Stenocorus schaumii* (LeConte) — are listed as rare in Virginia (Roble, 2013). *Dryobius sexnotatus* was collected near the study site in the Potomac River Gorge (Plummers Island, Maryland) in 1920 (Staines,

2008). There are no federally listed threatened or endangered longhorned beetles in the eastern United States.

STUDY SITE

The study site includes lands managed by the National Park Service as units of the George Washington Memorial Parkway (GWMP) in Fairfax County, Virginia, and Montgomery County, Maryland. Park sites in Virginia that received the greatest inventory effort included Dyke Marsh Wildlife Refuge, Great Falls Park, and Turkey Run Park. These sites total approximately 757 ha, including 506 ha of predominately deciduous upland forest, 73 ha of deciduous swamp forest, and 22 ha of cattail marsh. A few additional records were added from smaller GWMP sites such as Collingwood Picnic Area, Fort Hunt Park, and Little Hunting Creek. The only Maryland site surveyed was the 5 ha Glen Echo Park, which has only 3 ha of forest cover. Despite its small size, the bright lights of Glen Echo Park proved attractive to many longhorned beetles. Glen Echo, Great Falls, and Turkey Run Parks fall within the Piedmont physiographic province, whereas all other collection sites are on the Coastal Plain. All sites are situated along the shore of the Potomac River, and Glen Echo, Great Falls, and Turkey Run Parks border the Potomac River Gorge, an area known for high species richness of plants and animals (Cohn, 2004; Evans, 2008), including plant communities found nowhere else on Earth (Steury et al., 2008).

METHODS

The number of cerambycid species recorded from GWMP has grown since the first inventory targeting this family documented 22 species in Great Falls and Turkey Run Parks on three days (23–25 June 2006) during the Potomac Gorge Bioblitz (Evans, 2008). The current list of 80 species is the result of 17 years (1998–2014) of sporadic survey effort targeting arthropods using the following collecting techniques: Malaise traps set at Dyke Marsh (five years), and Great Falls and Turkey Run Parks (three years); pitfall traps set at Dyke Marsh (five years) and at Little Hunting Creek and Great Falls and Turkey Run Parks (three years); Lindgren funnel traps set at Dyke Marsh, Great Falls Park, Little Hunting Creek, and Turkey Run Park (two years); blacklighting with sheets at Great Falls and Turkey Run Parks (three years); and beating sheets, building lights (especially at Glen Echo), and hand picking from vegetation at all sites occasionally over the full length of the study. Specimens were pinned and

labeled and deposited in the collections maintained at the George Washington Memorial Parkway, Turkey Run Park Headquarters in McLean, Virginia. New Virginia records were determined by consulting the personal database of T. C. MacRae which is compiled from existing literature on North American Cerambycidae. Plant associations were noted for some specimens collected by hand. Collectors contributing specimens to the GWMP cerambycid collection include: E. M. Barrows, J. W. Brown, A. V. Evans, O. S. Flint, Jr., E. T. Oberg, D. R. Smith, W. E. Steiner, B. W. Steury, I. W. Steury, and N. E. Woodley.

RESULTS AND DISCUSSION

Eighty species, in 60 genera and five subfamilies, of cerambycid beetles were found. Twelve species (see list of species) are documented in the literature for the first time from Virginia. Malaise traps, which captured 55 species (33 unique), and hand picking (34 species, 16 unique) were the most successful capture methods employed during the survey. Fourteen species were found to be common, 11 uncommon, and 55 rare. Great Falls Park was the most species-rich site with 45 species (18 unique), followed by Turkey Run Park (37 species, 7 unique), Dyke Marsh (32, 13), and Glen Echo Park (18, 4). Two species, *Hylotrupes bajulus* (Linnaeus) and *Phymatodes testaceus* (Linnaeus), are considered adventive to North America. No state-listed species were found.

The GWMP tally of 80 cerambycid species is 16 greater than the total number recorded from the 3.6 ha Plimmers Island, Maryland, located in the Potomac River Gorge, from which 413 specimens were collected over a 110-year period and only 25 of these after 1927 (Hoffman et al., 2002; Staines, 2008). Only 32 species recorded during this study have also been found on Plimmers Island. Twenty-four species found at sites within the Potomac River Gorge during this study are not known from Plimmers Island and were not recorded during the 2006 Potomac Gorge Bioblitz. These additions increase the number of cerambycids documented from the Potomac River Gorge to 101 species, which is 39.9% of the number documented from Maryland (Staines, 1987; Glaser, 1992).

LIST OF SPECIES

Nomenclature and subfamilial taxonomic order follow Bezark & Monné (2013). Taxa are listed alphabetically by genus within subfamilies. Twelve species not previously documented in the literature from Virginia are marked with an exclamation point (!) and their first year of capture noted. Twenty-four

species previously unrecorded from the Potomac River Gorge are marked with an asterisk (*). Species are designated as rare (R) if 1-5 specimens were collected or observed, uncommon (U) for 6-12 specimens, and common (C) if more than 12 specimens were found. Collecting sites are abbreviated as follows: Collingwood Picnic Area (CP), Dyke Marsh Wildlife Preserve (DM), Fort Hunt Park (FH), Glen Echo Park (GE), Great Falls Park (GF), Little Hunting Creek (LH), and Turkey Run Park (TR). The earliest and latest dates of collection are given for each species using three letter acronyms for the month. For trap sets over multiple weeks (rarely more than 14 days) the first day of the set is used as the earliest date and the last day of the set for the latest date. Collection methods are listed using the following abbreviations: black UV light (bl), beating sheet (bs), hand picking (hp), Lindgren funnel (lf), Malaise trap (mt), and pitfall trap (pf). For species not previously documented in the literature from Virginia the known ranges and larval host plants are given following Yanega (1996) and Lingafelter (2007). If adults were handpicked from flowers the plant association is given when known.

Subfamily Prioninae

Orthosoma brunneum (Forster) – C; CP, DM, GF, TR; 29 Jun-4 Aug; hp, lf, mt.

Prionus imbricornis (Linnaeus) – R; GF; 23 Jun-30 Jul; bl, mt.

Prionus laticollis (Drury) – R; TR; 2 Aug; hp. At light on building.

Subfamily Aseminae

Asemum striatum (Linnaeus) – R; LH; 28 Apr-18 May; pf.

Subfamily Lepturinae

Analeptura lineola (Say) – C; DM, GF, TR; 21 May-21 Jul; mt.

**Bellamira scalaris* (Say) – R; DM, TR; 10 May-18 Jul; mt.

**Brachyleptura rubrica* (Say) – R; GF; 27 Jun; collection method unknown.

**Centrodera decolorata* (Harris) – R; TR; 27 May 2006; bl. Larvae feed on the heartwood of living and dead hardwoods. This northeastern species has been

recorded south to Georgia and west to Iowa.

**Gaurotes cyanipennis* (Say) – R; GF; 21 May-18 Jun; mt.

Judolia cordifera (Olivier) – R; DM; 14-24 Jun; mt. The larval host of this species is reported as *Castanea* (chestnut). However, most lepturines will breed in well-decayed wood of many species, and thus, show little host fidelity. With the near extinction of *Castanea dentata* (Marsh.) Borkh. (American chestnut), to *Cryphonectria parasitica* (Murrill) Barr (chestnut blight fungus), *J. cordifera* is primarily restricted to a single native North American *Castanea* species, *C. pumila* (L.) P. Mill. (chinkapin). *Castanea pumila* is not known to grow anywhere near Dyke Marsh, however *Castanea mollissima* Blume. (Chinese chestnut) has been planted near Dyke Marsh at Belle Haven Marina and has been naturalized along the shore of the Potomac River just south of Dyke Marsh at Riverside Park (Steury, 2011). The exotic Chinese chestnut, another unknown species, or simply well decayed wood may now serve as a primary host for *J. cordifera*. This beetle is quite common in the Ozarks despite the rarity of *Castanea* hosts (MacRae, 1994; Yatskievych, 2013).

**Leptura plebeja* Randall – R; GF; 21 May-30 Jun; mt.

Metacmaeops vittata (Swederus) – C; GF, TR; 21 May-21 July; hp, mt. Adults collected on flowers of *Aruncus dioicus* (Walter) Fernald (goat's beard, also known as bride's feathers).

**Necydalis mellita* (Say) – R; GF; 1 Jun; hp. Collected on the leaf of a shrub in Great Falls Swamp.

**Neoalosterna capitata* (Newman) – R; GF; 10-30 Apr; mt. Larvae feed on *Betula* spp. (birch), while adults have been found on a variety of flowers. Yanega (1996) lists the flight period of this beetle as May to July in eastern North America. During this survey it was captured in a Malaise trap open from 10-30 April 2009, suggesting an earlier flight period in Virginia. The species has been recorded from southeastern Canada south to Georgia and west to Iowa, Missouri, and Mississippi.

**Rhagium inquisitor* (Linnaeus) – R; GF; 14 Apr; hp. Collected under bark of dead tree.

Strangalepta abbreviata (Germar) – R; GF, TR; 19-30 Jun; hp, mt. Collected on flowers of *Saururus cernuus* L. (lizard's-tail).

Strangalia acuminata (Olivier) – U; DM, 23 May-7 Jul; mt. The elytra of our six specimens are tannish-brown with black edges as is typical of northern populations rather than the all black elytra found at more southern latitudes.

Strangalia bicolor (Swederus) – R; GF; 19-30 Apr; mt.

Strangalia famelica famelica Newman – R; GF; 24 Jun; hp. Collected on flowers of lizard's-tail.

Strangalia luteicornis (Fabricius) – C; DM, GF, TR; 28 May-20 Jul; hp, mt. Collected on flowers of lizard's-tail.

**Strophiona nitens* (Forster) – R; GF; 19-30 Apr; mt.

*!*Trachysida mutabilis* (Newman) – R; TR; 7-21 Jul 2006; mt. Larvae breed in a variety of deciduous hardwoods, while adults are most often found on flowers of woody shrubs. The species is widespread across eastern North America and has been recorded west to British Columbia, North Dakota, Missouri, and Mississippi.

**Trigonarthris proxima* (Say) – R; GF; 1 Jun; hp.

Typocerus acuticauda acuticauda Casey – R; GF; 17-24 Jun; hp. Adults collected on flowers of lizard's-tail. Larval feeding habits are unknown.

Typocerus velutinus (Olivier) – C; DM, GF, TR; 3 Jun-26 Jul; mt.

Subfamily Cerambycinae

Anelaphus parallelus (Newman) – R; DM, GE, TR; 18 Apr-18 Jun; hp, mt.

Anelaphus pumilus (Newman) – R; GE; 9 Jun; hp.

Anelaphus villosus (Fabricius) – R; DM, GE, TR; 17 May-21 Jul; hp, mt.

*!*Clytus ruficollis* (Olivier) – C; DM, GF, TR; 21 May-21 Jul, [1998]; mt. Larvae feed in a variety of decaying deciduous hardwoods. The species has been recorded broadly in northeastern North America south to Georgia and west to Saskatchewan, North Dakota, and Iowa.

Curius dentatus Newman – U; DM; 24 Jun-9 Aug; mt. This species is at the northern limit of its known range in Fairfax County, Virginia (Perry, 1974).

**Cyrtophorus verrucosus* (Olivier) – C; DM, GF, LH, TR; 10 Apr-18 Jun; pf, mt.

Eburia quadrigeminata (Say) – R; GE; 9-30 Jul; hp.

Elaphidion mucronatum (Say) – C; DM, GE, GF, TR; 6 Jun-26 Jul; bl, bs, hp, mt.

*!*Enaphalodes rufulus* (Haldeman) – R; GF; 30 Jun 2007; bl. Larvae feed within the sapwood of living *Quercus* spp. (oaks) and sometimes *Acer* spp. (maple). The species has been recorded from southeastern Canada to Florida and west to Iowa, Oklahoma, and Arizona.

Eudercus picipes (Fabricius) – R; GF; 19-30 Jun; mt.

Eudercus pini (Olivier) – R; DM; 3 Apr-23 May; mt.

Eudercus reichei LeConte – R; DM; 4-18 May; mt.

Hylotrupes bajulus (Linnaeus) – R; CP; 22 Sep; hp. This species is native to the Atlas Mountains of northern Africa. It was introduced to the U. S. over 200 years ago and now ranks second after subterranean termites in damage inflicted by insects to buildings (Cannon & Robinson, 1982).

*!*Molorchus bimaculatus bimaculatus* Say – U; DM, GF; 14-28 Apr, [1998]; hp, mt. Larvae mine beneath bark of dead branches of numerous hardwoods, especially maple and birch. The species occurs broadly across North America and is divided into several subspecies, with the nominate form recorded in the eastern part of the continent south to Florida and west to Saskatchewan, Oklahoma, and New Mexico.

Neoclytus acuminatus acuminatus (Fabricius) – C; DM, GE, GF, TR; 9 May-29 Aug, 21 Nov; hp, mt. Adult collected on standing dead *Acer saccharum* Marsh. (sugar maple).

*!*Neoclytus caprea* (Say) – R; DM; 11-25 Apr 1999; mt. Larvae of this species prefer sapwood of *Fraxinus* spp. (ash) but will sometimes use oak or *Carya* spp. (hickory). This lovely longhorned beetle could be at risk as the non-native buprestid beetle, *Agrilus planipennis* Fairmaire (emerald ash borer), continues to kill ash trees across the northeastern United States. It has been recorded broadly across eastern North America south to Georgia and as far west as Wyoming, Utah, and Arizona.

!*Obrium maculatum* (Olivier) – U; DM; 23 May-9 Aug, [1998]; mt. Larvae feed on numerous hardwoods, especially oak and hickory, and shrubs. The species has been recorded from the northeastern U. S. south to Florida, west to Iowa, Oklahoma, and Texas, and further south into Mexico and Central America.

*!*Phymatodes amoenus* (Say) – U; DM, GF; 11 Apr-20 May, [1998]; mt. Larvae mine in dead vines of *Vitis* spp. (grape). The species occurs in eastern North America south to Florida and west to Minnesota, Missouri, and Mississippi.

*!*Phymatodes testaceus* (Linnaeus) – R; CP, GE; 18 May-26 Jun, [2007]; hp. Larvae feed in and under the bark of hardwoods and pines. Adult color varies; one specimen possessed tan colored elytra, the other four had dark elytra with bluish reflections. Native to Europe, this introduced species is now found broadly across forested regions of North America.

Psyrassa unicolor (Randall) – R; GE; 15 Jul; hp.

Purpuricenus humeralis (Fabricius) – R; DM; 14-24 Jun; mt.

Smodicum cucujiforme (Say) – R; GE, GF; 15 Jun-12 Jul; bl, hp.

Stenosphenus notatus (Olivier) – R; GF; 24 Apr; hp.

Tessaropa tenuipes (Halderman) – R; DM; 10 May-16 Jun; mt.

Tilloclytus geminatus (Haldeman) – R; DM; 3 Apr-28 May; mt.

Tylonotus bimaculatus Haldeman – R; GF, TR; 18-23 Jun; bl. The preferred native larval host plant is ash, a declining species in northeastern North America. *Tylonotus bimaculatus* will also use non-native *Ligustrum* spp. (privets) and other native hardwoods.

Xylotrechus colonus (Fabricius) – C; DM, GF, LH, TR; 28 Apr-17 Aug; bl, lf, hp, mt, pf.

Subfamily Lamiinae

Aegomorphus modestus (Gyllenhal) – R; GF; 16-30 Jul; mt.

Astylopsis macula (Say) – U; GF, TR; 24 Jun-17 Aug; bs, mt.

**Astylopsis sexguttata* (Say) – R; DM, TR; 2-20 Jul; mt.

Astyleiopus variegatus (Haldeman) – R; GE, TR; 9 Jun-24 Sep; hp, pf.

!*Cyrtinus pygmaeus* (Haldeman) – R; DM; 28 May-19 Jul, [1998]; mt. Larvae feed on dry branches of numerous hardwoods, especially oak. This tiniest of North American cerambycids has been recorded from Ontario south to Georgia and west to Missouri and Texas.

Dectes texanus LeConte – R; DM; 1 Aug; mt.

Ecyrus dasycerus dasycerus (Say) – R; GE, GF, TR; 24 Jun-26 Jul; bs, hp, mt.

Eupogonius pauper LeConte – U; GF, TR; 21 May-24 Jun; bl, bs, mt.

Eupogonius subarmatus (LeConte) – R; TR; 24 Jun; hp.

**Goes pulverulentus* (Halderman) – R; GE; 14 Jul; hp.

**Goes tigrinus* (DeGeer) – R; GF; 20 Jun; bl.

Graphisurus despectus (LeConte) – U; GE, GF, TR; 24 Jun-21 Jul; bs, hp, mt.

Graphisurus fasciatus (DeGeer) – U; GE, GF, TR; 10 Jun-7 Sep; bf, bl, hp, mt.

**Hippopsis lemniscata* (Fabricius) – C; DM, GF; 19 Jun-17 Aug; mt.

Hyperplatys aspersa (Say) – C; DM, GF, TR; 21 May-26 Jul; mt.

Lepturges confluens (Haldeman) – C; GE, GF, TR; 9 Jun-21 Jul; bl, bs, hp, mt.

Monochamus titillator (Fabricius) – R; FH; 23 Jun; hp. Found dead in parking lot.

Oberea perspicillata Haldeman – U; DM, GE, GF, TR; 6 Jun-21 Jul; hp, mt.

**Oberea praelonga* Casey – R; TR; 19-30 Jun; mt.

Oberea tripunctata (Swederus) – R; GE, TR; 22 Jun-21 Jul; hp, mt.

Psenocerus supernotatus (Say) – C; DM, TR; 19 Apr-21 Jul; mt.

**Saperda lateralis* Fabricius – R; TR; 19-30 Jun; mt.

*!*Saperda puncticollis* Say – R; TR; 19-30 Jun 2009; mt. The larvae of this species feed on dead and dying *Parthenocissus quinquefolia* (L.) Planch. (Virginia creeper), grape, and *Toxicodendron radicans* (L.) Kuntze (poison ivy). The species has been recorded from southeastern Canada south to Georgia and west to Minnesota, Kansas, and Arkansas.

Styloleptus biustus biustus (LeConte) – R; DM; 24 Jun-7 Jul; mt.

**Tetraopes tetrophthalmus* (Forster) – R; GE, GF, TR; 22 May-31 Jul; hp. Adults collected on *Asclepias syriaca* L. (common milkweed).

Urgleptes querci (Fitch) – R; GF, TR; 24 Jun-30 Jul; bs, mt.

Urgleptes signatus (LeConte) – U; GF, TR; 21 May-17 Jul; bs, mt.

Urgleptes facetus (Say) – R; GF; 24 Jun; bs.

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Aquatic Snails (Gastropoda) from National Park Sites in Northern Virginia and Adjacent Maryland, with an Updated Checklist of Regional Species

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ABSTRACT

Twenty-three species of aquatic snails in nine families were documented during water quality monitoring studies and as incidental finds during land snail surveys at National Park sites in Fairfax and Arlington counties, and the City of Alexandria, Virginia, and Prince Georges County, Maryland. County checklists of the regional aquatic snail fauna account for a total of 32 species. The non-native snail *Bellamya chinensis* (Reeve) and the native species *Gyraulus deflectus* (Say) are documented for the first time from Maryland.

Key words: aquatic snails, Gastropoda, Maryland, Virginia.

INTRODUCTION

Non-marine mollusks are rapidly declining globally. Mollusks have the dubious distinction of having the highest number of documented extinctions of any major taxonomic group over the last 500 years with non-marine (freshwater and land) species constituting 99% of all molluscan extinctions (Lydeard et al., 2004). Undoubtedly, the actual number of extinctions is much higher than the documented number because many species likely go extinct before they are discovered. As recently as 1982, freshwater gastropods were thought to be represented in North America (north of Mexico) by 15 families, 78 genera, and approximately 500 species (Burch, 1982). However, just the work of Hershler (1998, 1999) has added 65 hydrobiid species and subspecies from the western United States to that tally. At least 53 species have been recorded from Virginia (Stewart & Dillon, 2004), but few county level checklists have been published for the Commonwealth (Beetle, 1973; Stewart & Dillon, 2004; Dillon et al., 2013). Only Dillon et al. (2013) included county level distribution based on recent surveys, but they did not include Arlington County or the City of Alexandria in the mapped distributions, or perhaps lumped them within Fairfax County. Their findings included 17 extant species of freshwater gastropods (including three limpets) in Fairfax County, Virginia and 12 extant species in Prince Georges County, Maryland.

Additional records from National Park Service (NPS) lands during this study added four species for Fairfax County, ten in Arlington County, eight in the City of Alexandria, and seven in Prince Georges County.

STUDY SITE AND METHODS

Inventories were conducted in streams and along the freshwater tidal and non-tidal shore of the Potomac River in areas managed by NPS, George Washington Memorial Parkway (GWMP), in Fairfax and Arlington counties, and the City of Alexandria, Virginia, from the American Legion Bridge (I-495) to Mt. Vernon, in Great Falls Park, and at National Capital Parks-East (NCPE) in Prince Georges County, Maryland (Ft. Washington and Piscataway parks). Aquatic snails were collected as incidental finds during inventories targeting land snails and when encountered during water quality testing (duMais et al., 2010) in Virginia streams flowing into the Potomac River Gorge (Mine Run, Pimmit Run, Gulf Branch, Turkey Run, Dead Run, Donaldson Run, Spout Run, Difficult Run, and Windy Run). A 0.91 m x 0.91 m kick-seine net (1.6 mm mesh) was used during water quality monitoring to sample riffles. The net was placed perpendicular to the water flow immediately downstream of a sampling area and the streambed in front of the net was vigorously churned for 90 seconds by foot shuffling and lifting and scrubbing larger rocks.

Productive areas for aquatic snails included both shores of the Potomac River, Piscataway Creek in Maryland, and Little Hunting Creek in Virginia. Aquatic snails were also found in swamps and marshes at these locations, the most extensive of which is Dyke Marsh, a 131 ha tidal wetland dominated by narrow-leaved cattail (*Typha angustifolia* L.) and river bull-rush (*Bolboschoenus fluviatilis* [Torr.] Soják) and a surrounding swamp largely composed of pumpkin ash (*Fraxinus profunda* [Bush] Bush). Similar, but smaller, swamps and marshes were sampled in Piscataway and Ft. Washington parks, and along the bank of Little Hunting Creek. Taxonomic nomenclature follows that used by Turgeon et al. (1998), except for the placement of limpets within the Planorbidae following Walther et al. (2010). Shells were keyed to species using Burch (1982) and Jokinen (1992). Voucher specimens from GWMP are deposited in the natural resource collections at GWMP, Turkey Run Park Headquarters in McLean, Virginia. Snails collected at NCPE are deposited at the Museum Resource Center in Landover, Maryland.

RESULTS AND DISCUSSION

A total of 23 species in 9 families was documented in 2010 and 2011 (detailed below). The non-native snail *Bellamya chinensis* and the native species *Gyraulus deflectus* are documented for the first time from Maryland. The collection of *Fontigens bottimeri*, *Lyogyrus granum*, *Physa gyrina*, and *Planorbula armigera*, provide the first evidence that these species are still extant in Fairfax County based on records in Dillon et al. (2013). However, other recent records exist for *F. bottimeri* from Fairfax County (Culver & Pipan, 2008; Culver et al., 2012), and older records exist for *L. granum*, *P. gyrina*, and *P. armigera* from Fairfax County or the vicinity of Washington, DC (Richards, 1934; Beetle, 1973; Stewart & Dillon, 2004; Pearce & Evans, 2008).

Amnicola limosa, *Bithynia tentaculata*, *Goniobasis virginica*, *Gyraulus deflectus*, *G. parvus*, *Menetus dilatatus*, and *Physa acuta* are recorded for the first time from Arlington County and *A. limosa*, *B. tentaculata*, *G. virginica*, *G. parvus*, *Lymnaea humilis*, and *P. acuta* are recorded for the first time from the City of Alexandria. *Bellamya chinensis*, *Bellamya japonica*, *B. tentaculata*, *G. deflectus*, *L. humilis*, and *P. armigera* are reported for the first time from Prince Georges County. *Bellamya chinensis*, *B. japonica*, and *B. tentaculata* are non-native introduced species from Asia (*Bellamya*) and Europe (*Bithynia*). The Fairfax County checklist now stands at 32 species, while 11 species have been recorded in Arlington County, nine species

in the City of Alexandria, and 19 species in Prince Georges County (Table 1). Beetle (1973) reported *Gillia altilis*, *Lioplax subcarinata*, and *Viviparus georgianus* from Fairfax County, while more recent Virginia records from Dillon et al. (2013) only include these snails from a few counties near the southern state line. *Marstonia lustrica* is tentatively reported for Fairfax County based on a record in Thompson (1977) with the caveat that it “need(s) to be confirmed with new material.” Beetle’s (1973) record for *Lymnaea caperata* Say from Fairfax County was not included based on Stewart & Dillon’s (2004) comment that it is a northern species unlikely to have ever occurred in Virginia.

LIST OF SPECIES

VIVIPARIDAE

Campeloma decisum (Say, 1816), Pointed Campeloma – Potomac River Gorge, shore near Sandy Landing and Difficult Run in Great Falls Park (GFP), and at the mouth of Turkey Run, in Turkey Run Park (TRP). A juvenile sinistral specimen was found near Difficult Run on 15 September 2010. This coiling pattern has been reported in juveniles of this species, but is rarely found in mature individuals (Pilsbry, 1896), perhaps indicating an ecological disadvantage for sinistral animals.

Bellamya chinensis (Reeve, 1863), Chinese Mysterysnail – Five mature shells and one 9 mm juvenile shell of this snail were found in Piscataway Creek at the end of Wharf Road. This species is easily distinguished from *Bellamya japonica* (von Martens) by the absence of a spiral angulation of the apical whorls, the spiral row of small pits on the ultimate whorl, and the dark band encircling the inner lip of the aperture. Dillon et al. (2013) did not include any extant records for this species from Atlantic drainages in Virginia or Maryland. The report of *Cipangopaludina* (*Bellamya*) *chinensis* from Virginia by Stewart & Dillon (2004) is probably based on taxonomic confusion that existed at that time with *B. japonica*, a common, widespread species which they did not report. The largest shell found in Piscataway Creek measured 60 mm high.

Bellamya japonica (von Martens, 1861), Japanese Mysterysnail – Regularly observed on the shore of the Potomac River and at Roaches Run Waterfowl Sanctuary, Daingerfield Island, Jones Point, Dyke Marsh, and Accokeek Creek. The largest shell measured 73 mm high.

VALVATIDAE

Valvata tricarinata (Say 1817), Three-ridge Valvata – This species was found only at Dyke Marsh where three shells were collected under a log on a cobble beach on 15 May 2011. In Maryland and Virginia this species is documented as extant only from near Washington, DC in Prince Georges, Fairfax, and Loudoun counties (Dillon et al., 2013).

BITHYNIIDAE

Bithynia tentaculata (Linnaeus, 1758), Mud Bithynia – This non-native snail is sporadic in occurrence, but empty shells can be locally abundant on flood-deposited sand within the Potomac River Gorge from GFP to Key Bridge. Shells were also found on the shore of the Potomac at Dyke Marsh, Roaches Run Waterfowl Sanctuary, Jones Point, and Ft. Washington. Extant populations of this non-native snail in Maryland and Virginia, are centered in the Washington, DC area (Dillon et al., 2013), and an older record exists from Rockbridge County (Beetle, 1973).

HYDROBIIDAE

Amnicola limosa (Say, 1817), Mud Amnicola – One shell was found on the shore of the Potomac River north of Riverside Park and one at Dyke Marsh. It was also found at Roaches Run Waterfowl Sanctuary and Jones Point and was frequently observed on the shore of Piscataway Creek near Wharf Road.

Fontigens bottimeri (Walker, 1925), Appalachian Springsnail – This minute aquatic snail was found at seeps and along the edge of a small stream in GFP and TRP. It is state-listed as Endangered in the Commonwealth (Roble, 2013). Although not included for Fairfax County by Dillon et al. (2013), previous records were noted for the area by Culver & Pipan (2008) and Culver et al. (2012). Their assertion that this species is a hypotelmiorheic specialist is questioned due to its presence along a stream bank in GFP.

Lyogyrus granum (Say, 1822), Squat Duskysnail – The only specimen of this species was found at Dyke Marsh on 9 September 2010.

PLEUROCERIDAE

Pleurocera virginica (Say, 1817), Piedmont Elimia –

This species is frequently observed in shallow water along the shore of the Potomac River throughout the survey area.

Leptoxis carinata (Bruguiere, 1792), Crested Mudalia – This species was found only in the Potomac River Gorge area of GFP and TRP, where it was rare.

POMATIOPSIDAE

Pomatiopsis lapidaria (Say, 1817), Slender Walker – This species was found at Dyke Marsh, Little Hunting Creek, Roaches Run Waterfowl Sanctuary, Jones Point, Swan Creek, and in swamps along Wharf Road. Although it is widely accepted to be an amphibious land snail (Hubricht, 1985), many authors, (e.g., Jokinen, 1992; Dillon et al., 2013), include it in lists of aquatic gastropods. Dillon et al. (2013) do not report *P. lapidaria* from Maryland and list it for only one county in Virginia (Fairfax). Recently, Steury & Pearce (2014) reported this species as common in the Washington, DC area.

LYMNAEIDAE

Lymnaea humilis Say, 1822, Marsh Fossaria – Populations were found at Roaches Run Waterfowl Sanctuary and on the bank of the Potomac River at Daingerfield Island and Jones Point. It was also found on the bank of Piscataway Creek at Wharf Road.

Lymnaea (Pseudosuccinea) columella Say, 1817, Mimic Lymnaea – This species was found only in one short reach of Mine Run where it was collected on rocks a few cm above the water line. National Park Service water quality monitoring data collected between 2005 and 2010 has consistently shown that Mine Run has the best water quality of any Virginia stream in the Potomac River Gorge.

PHYSIDAE

Physa acuta Drapardaud, 1805, European Physa – This species is abundant at Dyke Marsh and was also found in Mine Run and Difficult Run in GFP, at Roaches Run Waterfowl Sanctuary, Jones Point, and on the shore of Piscataway Creek.

Physa gyrina (Say, 1821), Tadpole Physa – This snail was found in potholes of large boulders in the riverside outcrop barren area of GFP. One empty shell found at Dyke Marsh was tentatively identified as this species.

Table 1. Aquatic Gastropods of Arlington and Fairfax Counties and the City of Alexandria, Virginia, and Prince Georges County, Maryland, reported from this survey (N), and in Beetle, 1973 (B); Culver & Papan, 2008 (C), Dillon et al., 2013 (D), Stewart & Dillon, 2004 (S), and Thompson, 1977 (T).

Family	Species	Fairfax	Arlington	Alexandria	Prince Georges
VIVIPARIDAE	<i>Campeloma decisum</i> (Say)	B, D, N, S			
	<i>Bellamya chinensis</i> (Reeve)				N
	<i>Bellamya japonica</i> (von Martens)	D, N, S	N, S	N, S	N
	<i>Lioplax subcarinata</i> (Say)	B, S			
	<i>Viviparus georgianus</i> (Lea)	B, S			
VALVATIDAE	<i>Valvata tricarinata</i> (Say)	B, D, N, S			D
BITHYNIIDAE	<i>Bithynia tentaculata</i> (Linné)	B, D, N, S	N	N	N
HYDROBIIDAE	<i>Amnicola limosa</i> (Say)	B, D, N, S	N	N	D, N
	<i>Fontigens bottimeri</i> (Walker)	C, N			
	<i>Gillia altilis</i> (Lea)	B, S		B	
	<i>Lyogyrus granum</i> (Say)	B, N, S			D
	<i>Marstonia lustrica</i> (Pilsbry)	T			
	<i>Somatogyrus virginicus</i> (Walker)	B			
	<i>Littoridinops tenuipes</i> (Couper)				D
PLEUROCIDAE	<i>Goniobasis virginica</i> (Say)	B, D, N, S	N	N	D, N
	<i>Leptoxis carinata</i> (Bruguiere)	B, D, N, S			
POMATIOPSISIDAE	<i>Pomatiopsis lapidaria</i> (Say)	B, D, N, S	B, N, S	N	N
LYMNAEIDAE	<i>Lymnaea humilis</i> Say	D, S	B, N	N	N
	<i>Lymnaea columella</i> (Say)	B, D, N, S			D
PHYSIDAE	<i>Physa acuta</i> Drapardaud	B, D, N, S	N	N	D, N
	<i>Physa gyrina</i> (Say)	B, N, S			
	<i>Physa pomilia</i> (Conrad)	B			
	<i>Physa carolinae</i> Wethington, Wise & Dillon				D
PLANORBIDAE	<i>Gyraulus deflectus</i> (Say)	B, S	N		N
	<i>Gyraulus parvus</i> (Say)	D, N	N	N	D, N
	<i>Helisoma anceps</i> (Menke)	B, D, N, S	B		D
	<i>Helisoma trivolvis</i> (Say)	B, D, N, S			
	<i>Menetus dilatatus</i> (Gould)	B, D, N, S	N		D, N
	<i>Planorbula armigera</i> (Say)	B, N, S			N
	<i>Ferrissia fragilis</i> (Tryon)	D, S			D
	<i>Ferrissia rivularis</i> (Say)	B, D, N, S			
	<i>Laevapex fuscus</i> (C.B. Adams)	D, N			

PLANORBIDAE

Gyraulus deflectus (Say, 1824), Flexed Gyro – One shell attributable to this species measuring 5.1 mm maximum diameter was found on the bank of Piscataway Creek at Wharf Road. Another freshly empty shell was found at Roaches Run Waterfowl Sanctuary. In Virginia, other extant populations are known only from Accomack County (Dillon et al., 2013), but Beetle (1973) cites an older record from Fairfax County. This is the first known record of this species in Maryland.

Gyraulus parvus (Say, 1817), Ash Gyro – Three shells were found at Dyke Marsh and one on a beach at the mouth of Difficult Run in the Potomac River Gorge. The species is abundant at Roaches Run Waterfowl Sanctuary and at Jones Point. One shell was found on the shore of the Potomac River at Ft. Washington Park.

Helisoma anceps (Menke, 1830), Two-ridge Rams-horn – Three snails were collected during water quality sampling in GFP in Difficult Run.

Helisoma trivolvis (Say, 1817), Marsh Rams-horn – Single shells were found in a ditch along the Mt. Vernon Trail near Dyke Marsh, on a muddy shore near Aqueduct Dam, and at the mouth of Difficult Run in GFP.

Menetus dilatatus (Gould, 1841), Bugle Sprite – One snail was found during water quality sampling in Mine Run and three were found in Difficult Run. This species was also found at Roaches Run Waterfowl Sanctuary and a shell was found on the bank of Piscataway Creek at Wharf Road.

Planorbula armigera (Say, 1821), Thicklip Rams-horn – One shell was found under loose bark of a large fallen tree in Dyke Marsh swamp forest and three shells were found at the edge of a vernal pool near the Wharf Road section of Piscataway Creek. Just outside the study area in Charles County, Maryland, this snail was observed to be common in Bull Cove Marsh in association with the land snails *Vertigo ovata* Say and *Carychium exiguum* (Say). The only other extant Virginia records are from the southeastern portion of the state (Charles City, Southampton, and Greensville counties; Dillon et al., 2013). However, this snail was found in Maryland in Montgomery County (Pearce & Evans, 2008) and older records exist for Fairfax County (Beetle, 1973).

Ferrissia rivularis (Say, 1817), Creeping Ancyloid – This limpet was found in Difficult Run where it was common at one sampling site and a single specimen was found in Pimmit Run.

Laevapex fuscus (C. B. Adams, 1841), Dusky Ancyloid – This limpet was found only in Dead Run in TRP.

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Shorter Contributions

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A COLLECTION OF SHREWS FROM FORESTS IN FRANKLIN COUNTY, VIRGINIA. — In Virginia, shrews (Soricidae) have been the subject of a number of localized studies (Linzey, 1998), but there is still limited knowledge about their abundance and distribution in many portions of the state. Shrews are common in forest habitats throughout Virginia, although they tend to increase in diversity in cool, moist forests at high elevations (Ford et al., 2006). The abundance and diversity of shrews has been associated with invertebrate abundance, and moist soil and forest leaf litter (Getz, 1961; Kirkland, 1991).

In Franklin County, there is little published information about shrew populations. The county lies within the transition zone between the Piedmont and Blue Ridge Mountain physiographic provinces, which also corresponds to the transition zone between the distributions of some shrew species. General reports and texts about the shrews in Virginia (Pagels et al., 1985; Webster et al., 1985; Linzey, 1998) are often based on incomplete information and new data would be useful in refining the distribution of shrew populations in the state.

Shrews are often difficult to identify due to their small size and similar external appearance (Webster et al., 1985) and distinguishing some species often requires close examination of their teeth. They are also cryptic in their habits and difficult to collect without labor- and time-intensive pitfall trapping (Ford et al., 2006). We took advantage of different pitfall trapping studies at and near Ferrum College in Franklin County which incidentally captured shrews. Due to their sensitivity to stress (Linzey, 1998), shrews often die in pitfall traps. We collected these dead shrews to make detailed measurements for species identification and to determine the relative abundance of each species in forest habitats at three sampling sites in Franklin County.

Shrews were collected using plastic silt fence drift fall arrays with pitfall traps ranging in size from 10-17 L. Three arrays were established at each of two sites with mature mixed-pine hardwood forests, one at Ferrum College and the other on a private property located approximately 1 mile from the college. There were six arrays in mixed pine-hardwood forest, three arrays at each of two sites. These arrays were arranged in the form of a “+” with five 17-L pitfall traps (one in the center and four at the ends of 5 m long silt fences). Silt fences were 50 cm tall and fastened to the ground

with landscape pins to prevent animals from passing under the fences. Forests were dominated by oaks (*Quercus* spp.), Red Maple (*Acer rubrum*), Tuliptree (*Liriodendron tulipifera*), and White Pine (*Pinus strobus*). An additional array was established along the forested border of Chapman Pond at Ferrum College. This array was linear in shape and included three 10-L pitfall traps along a 25 m fence with one trap in the middle and the other two near the opposite ends of the fence. Pitfall traps were smaller in this array because the water table was near the surface. Sampling occurred from June–September 2013 and during June 2014.

Live shrews were identified to species and released. Dead shrews were collected from pitfall traps on a daily basis during the sampling periods. If they were dry and intact, shrews were measured for total body length (including tail), tail length, hind foot length, and body mass. In addition, pelage and tail coloration and dentition were examined in order to identify shrews using the key developed by Linzey (1998). All captured shrews were numbered and frozen for a voucher collection located at Ferrum College.

We captured five species of shrews in our pitfall arrays, including 26 Pygmy Shrews (*Sorex hoyi*), 10 Smoky Shrews (*Sorex fumeus*), one Southeastern Shrew (*Sorex longirostris*), three Least Shrews (*Cryptotis parva*), and 14 Northern Short-tailed Shrews (*Blarina brevicauda*) (Table 1). The Pygmy Shrew was the most abundant species captured and occurred at all study sites. Morphometric data for this species (Table 1) corresponded closely with the description in Linzey (1998), as did the arrangement of unicuspid teeth. This shrew was once considered rare in Virginia (Webster et al., 1985), but it has since been found to be widely distributed throughout the state (Linzey, 1998).

We distinguished the Northern Short-tailed Shrew, the second most frequently captured species at our study sites, from the similar Southern Short-tailed Shrew (*Blarina carolinensis*) mostly based on geographic location (Webster et al., 1985; Linzey, 1998). Linzey’s (1998) key separates these species primarily on body size and hind foot length, but our measurements overlap the cited ranges of these measurements for both species (Table 1). The Northern Short-tailed Shrew is the larger of the two species, but some individuals that we captured may not have been full-grown adults. Identification of these two species is considered to be difficult where their ranges overlap in eastern Virginia (Webster et al., 1985).

The Smoky Shrew is also difficult to distinguish from the Southeastern Shrew, except for the larger size of the former. Some of our total body size

Table 1. Morphological characteristics (means and ranges) of shrews collected in forests of Franklin County, Virginia.

Species	Total Length (cm)	Tail Length (cm)	Hind Foot Length (cm)	Weight (g)
<i>Blarina brevicauda</i> (n = 14)	9.58 (8.3-10.8)	2.21 (2.0-2.5)	1.32 (1.1-1.5)	12.46 (9.3-14.5)
<i>Cryptotis parva</i> (n = 3)	6.43 (5.8-7.0)	1.60 (1.3-2.0)	0.70 (0.6-0.8)	3.83 (3.6-4.0)
<i>Sorex fumeus</i> (n = 10)	9.64 (8.1-10.6)	4.01 (3.4-4.5)	1.20 (1.0-1.3)	6.46 (4.5-8.7)
<i>Sorex hoyi</i> (n = 26)	6.69 (4.3-7.8)	2.64 (2.0-3.2)	0.78 (0.6-0.9)	2.34 (1.7-3.1)
<i>Sorex longirostris</i> (n = 1)	10.3	3.8	1.1	7.2

measurements are less than the lower range limit in Linzey's (1998) key, but, again, some of our captures could have included subadult shrews. Our identification was mainly based on dentition, and supported by pelage color and the extent of tail bicoloration. Smoky Shrews have reportedly been captured previously in Virginia only at elevations higher than 610 m (Linzey, 1998), but the elevations of our study sites are lower (ca. 440 m). Habitat characteristics of our study sites, however, are more favorable for the Smoky Shrew which prefers moist forest habitats with thick leaf litter (Webster et al., 1985). The Southeastern Shrew prefers thick understory vegetation, particularly those with vine tangles (Webster et al., 1985) which do not occur at our study sites and they are also reported to prefer disturbed habitats (VDGIF, 2014).

Finally, we recorded one Least Shrew at each of our three study sites. The species is thought to prefer grassy fields, rather than the older forests characteristic of our study sites (Linzey, 1998). Pagels et al. (1992) captured this species mostly in clearcuts, but also less frequently in 40-year-old mixed pine-hardwood forests in the Virginia Piedmont.

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COMPASS ORIENTATION OF AN INCUBATING AND BROODING RUBY-THROATED HUMMINGBIRD (*ARCHILOCHUS COLUBRIS*). — The literature on incubation behavior of hummingbirds is voluminous (Bent, 1940; Schuchmann, 1999) but surprisingly little has been written about the orientation of females on the nest. Hermits (*Phaethornis* and *Glaucis*) that attach their nests under drooping palm leaves invariably incubate with their heads facing the leaf surface (Skutch, 1951; Novaes & de Carvalho, 1957; Skutch, 1964; Oniki, 1970; Snow & Snow, 1973). Comparable data for the 300+ species of non-hermit hummingbirds are limited to scattered observations for a few tropical species. A female *Colibri thalassinus* repeatedly faced the same direction during incubation (Wagner, 1945), whereas *Campylopterus largipennis* faced the supporting stem of a palm leaf (Théry, 1987). In contrast, *Chaetocercus berlepschi* (Juiña et al., 2010) and *Amazilia fimbriata* (Haverschmidt, 1952) were observed making frequent turns on the nest and *Chlorostilbon mellisugus* was observed to incubate in all compass directions but more frequently faced the nest support (Thomas, 1994). The orientation of incubating females appears to be unrecorded for the most intensively studied hummingbird genera in North America (*Archilochus*, *Calypte*, and *Selasphorus*).

On 22 July 2014, I observed a female Ruby-throated Hummingbird (*Archilochus colubris*) gathering spider webs and prizing flakes of lichen from tree bark in my suburban yard in Fairfax County, Virginia (38° 46.3' N; 77° 5.7' W). Presumably the same female was observed gathering spider webs more than three dozen times in the same area during the next week. I found the nest and incubating female on 31 July on a sloping branch of a White Oak (*Quercus alba*) about 9 m above the ground. The nest was shaded but received dappled sunlight during the course of the day. I watched the nest daily, but at irregular intervals, from 31 July through 18 August with a 20× spotting scope. The nest contents could not be directly observed.

Incubation sessions were punctuated by brief feeding forays. The returning female invariably approached the nest from the same direction after a series of short hovering flights before settling immediately in the nest cup. However, I noted that the compass direction of the incubating female seemed to shift randomly, or nearly so, in successive incubation bouts (Fig. 1). Photographs taken from the same vantage point revealed that the elastic walls of the nest flexed in the direction faced by the incubating female.



Fig.1. Variation in orientation of an incubating female Ruby-throated Hummingbird (*Archilochus colubris*).

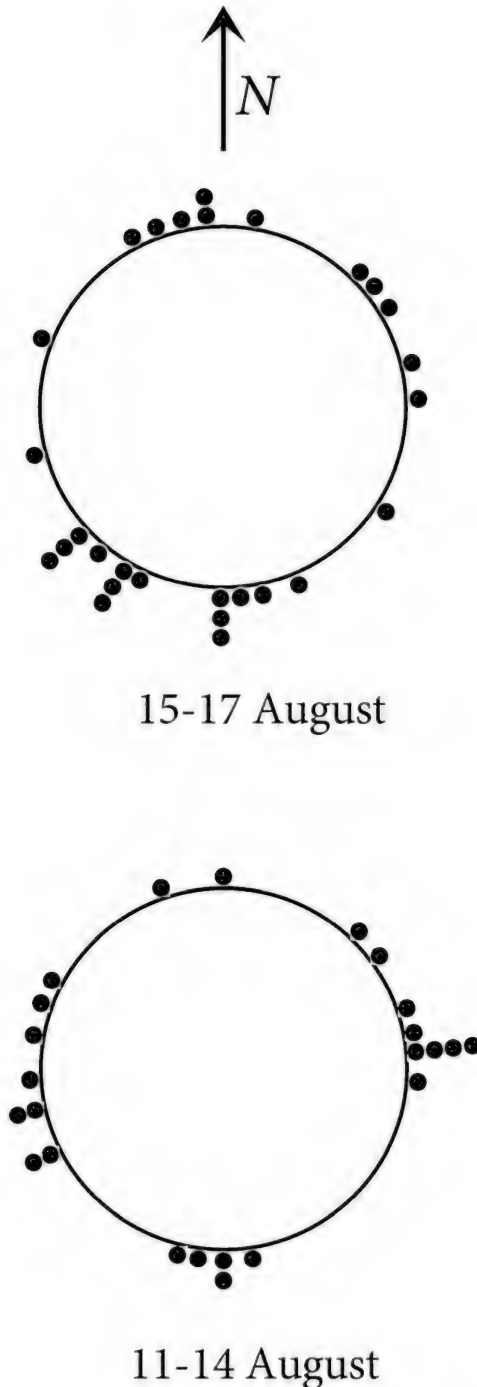


Fig. 2. Orientation of female Ruby-throated Hummingbird (*Archilochus colubris*) during early (11-14 August) and late (15-17 August) brooding periods.

Nest elasticity conferred by spider webs in the nest matrix has rarely been mentioned in the literature (Wueste, 1902).

The first evidence that the eggs had hatched was observed on the morning of 10 August when the female perched on the rim of the nest upon returning and began to feed a nestling. The female's brooding schedule was similar to the incubation schedule for the first four days after hatching but from the fifth day onward the duration of brooding bouts decreased and the length of absences from the nest increased, a pattern that is typical in hummingbirds (Baltosser, 1996). By the seventh day (17 August), the female brooded the nestlings only at night, returning to the nest at dusk. I recorded the direction faced by the female during 52 brooding bouts (11-17 August). The orientation of the brooding female changed frequently from bout to bout and the location of the most favored positions shifted over time, possibly owing to shifts in the postures and orientation of the rapidly growing nestlings. I tested the hypothesis that brooding orientation was uniformly distributed with the Hodges-Ajne test for circular uniformity (Zar, 1996). This relatively straightforward test is based on the total number of observations (n) and the smallest number of observations (m) that occur within a range of 180° . Under the null hypothesis of circular uniformity, the probability of observing an m at least this small is

$$P = 2^{1-n} (n - 2m) \binom{n}{m}$$

Observations were divided into early (11-14 August) and late (15-17 August) incubation periods (Fig. 2). Orientations were uniformly distributed in both incubation periods ($P > 0.50$).

A review of egg dates for Virginia indicates that this nest (hatching on 10 August) represents the latest definitive record for the state (Clapp, 1997). A female was reportedly incubating at Mountain Lake Biological Station, Giles County, on 12 August 1946 (Smyth, 1948). However, it is unclear from Smyth's account whether the female was incubating eggs or brooding nestlings.

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NOTEWORTHY BEETLE RECORDS FROM VIRGINIA, MARYLAND, AND THE DISTRICT OF COLUMBIA (COLEOPTERA: CARABIDAE AND CHRYSOMELIDAE)

VIRGINIA

Calligrapha floridana Schaeffer – Arlington Co.: Roaches Run Waterfowl Sanctuary, 25 and 26 June, 9 and 15 July 2014, Steury (George Washington Memorial Parkway [GWMP], 8). **NEW STATE RECORD.**

At least 600 *C. floridana* imagos were observed on 25 June 2014 severely defoliating seven shrubs of *Cornus amomum* Miller over an area of approximately 25 x 15 m. On 9 July 2014 the population was still at least 390 beetles, but by 15 July only 190 were observed. Two *Ulmus americana* L. and two *Alnus serrulata* (Aiton) Willd., known hosts of morphologically similar *Calligrapha* species were adjacent to the *C. amomum* population but contained no *Calligrapha* beetles. Known host plants of *C. floridana* are species of *Cornus* (Cornaceae) and questionably *Illicium* (Illiciaceae) (Clark et al., 2004). Published records for *C. floridana* are from Florida and South Carolina (Riley et al., 2003; Ciegler, 2007). Records of *Calligrapha knabi* Brown from North Carolina and Maryland by Gómez-Zurita (2005), Gómez-Zurita et al. (2006), and Staines & Staines (2009) are based on mistaken identifications of *C. floridana* (J. Gómez-Zurita, pers. comm). The Maryland record was found on *C. amomum* (Gómez-Zurita, 2005).

Despite being macropterous, these beetles were not observed to fly. Wing color varied from pale brown with a reddish base to mostly reddish. The reddish wing color did not show through the elytra as is typical in many *Calligrapha* species. Lengths ranged from 6.8 to 8.5 mm (mean = 7.7; n = 8), which is similar to the range of 7–8.4 mm cited by Ciegler (2007). The beetles preferred the underside of *C. amomum* leaves, either singly or in groups up to four, and exhibited no capture avoidance, except falling to the ground when repeatedly touched. No mating was observed and all specimens collected were female indicating that this population may be parthenogenetic, a trait reported for other *Calligrapha* species (Gómez-Zurita et al., 2006). The general range of *C. floridana* is southeastern North America east of the Appalachians, with records in addition to those cited above known from Alabama and Georgia (J. Gómez-Zurita, pers. comm). This record from Arlington County is the northernmost in the species' distribution.

Calosoma wilcoxi LeConte – Fairfax Co.: Turkey Run Park, 12 May 2014, Steury (GWMP, 1).

A specimen of *C. wilcoxi* was hand-collected on the exterior wall of the Resource Management Building, apparently attracted to lights at night. This represents the 256th ground beetle (Carabidae) species documented from the vicinity of the Potomac River Gorge (PRG) located between Fairfax County, Virginia, and Montgomery County, Maryland. Despite records of ground beetles from PRG dating back nearly 100 years (Erwin, 1981) and more recent surveys (Stork, 1984; Steury & Messer, 2014), *C. wilcoxi* was previously unrecorded from PRG. There was a large emergence of *C. wilcoxi*, a known predator of lepidopteran caterpillars, in Fairfax County during 2014. This event coincided with an unusually high abundance of *Alsophila pometaria* (Harris), fall cankerworm (Geometridae), as noted by Fairfax County Urban Foresters (Virginia Department of Forestry, 2014). That group conducted aerial spraying of the lepidopteran insecticide *Bacillus thuringiensis* in an effort to reduce reputed cankerworm defoliation of large canopy trees. On 3 May 2014, B. Steury observed 22 live *C. wilcoxi* on store fronts in the Hollin Hall Shopping Center along Fort Hunt Road in Fairfax County. Dozens of elytra and other residual body parts were observed on sidewalks in the area, presumably the result of bird predation. Tree crews were conducting canopy tree pruning activities along Fort Hunt Road on 2 May 2014. This disturbance may account for the large number of these arboreal, nocturnal, beetles being displaced and later attracted to store front lights.

However, large congregations at lights (presumably not associated with nearby tree pruning activities) is a behavior reported for *C. wilcoxi* (Larochelle & Larivière, 2003).

MARYLAND

Anisodactylus dulcicollis (LaFerté-Sénéctère) – Calvert Co.: Cove Point, 12 May 2012, Steury (USNM, 1). **NEW STATE RECORD.**

A specimen of *A. dulcicollis* was found under driftwood on the sand dune barrier that separates Cove Point Marsh from the Chesapeake Bay. Bousquet (2012) did not include Maryland in the extensive geographic distribution known for this species. It occurs from extreme southern Ontario to eastern Nebraska, south to southeastern Texas and west-central Georgia. It was recently reported for the first time from the District of Columbia (Steury & Messer, 2014).

Scarites vicinus Chaudoir – Baltimore Co.: Woodstock, 10037 Davis Drive, 30 July 2013, Steury (USNM, 1). **NEW STATE RECORD.**

Scarites vicinus was collected from a swimming pool skimmer at a residence bordering Patapsco Valley State Park. Fourteen other carabid beetles comprising nine species were recovered from the skimmers on the same day, including *Anisodactylus rusticus* (Say) (1), *Chlaenius tomentosus tomentosus* (Say) (1), *Cicindela punctulata punctulata* Olivier (1), *Cyclotrachelus sigillatus* (Say) (2), *Dicaelus elongatus* Bonelli (1), *Harpalus pensylvanicus* (DeGeer) (1), *Harpalus actiosus* Casey (1), *Poecilus lucublandus* (Say) (1), and *Scarites subterraneus* Fabricius (5). The documented range for *S. vicinus* is from southern Ontario to eastern North Dakota, south to northeastern Texas and northern Alabama (Bousquet, 2012). The species was recently reported for the first time from Virginia and the District of Columbia (Steury & Messer, 2014). This is the first published record for Maryland.

DISTRICT OF COLUMBIA

Tachys oblitus (Casey) – District of Columbia: Theodore Roosevelt Island, 22 September 2014, Steury (GWMP, 1). **NEW DISTRICT RECORD**

This tiny (2.5 mm) macropterous carabid was shaken from a moist log found under a boardwalk along the floodplain forest/marsh ecotone. It is distinguished from sympatric species of *Tachys* by the following combination of anatomical features: Pronotum with side

nearly straight before obtusely rounded hind angles, basal border moderately oblique laterally, and base behind transverse impression almost smooth (without row of rugae). Elytron with only first two striae well-impressed and without distinct dark cloud. Head almost black with rest of dorsum usually much paler (rufotestaceous to rufopiceus) but occasionally as dark as head. Microsculpture iridescent and equal on the pronotum and elytra. This record is not unexpected because the District of Columbia is near the middle of the East Coast range for the species. The known range for *T. oblitus* is from Québec to Georgia, along the Gulf Coast to Texas and in the Midwest to Iowa and Wisconsin (Bousquet, 2012; Messer, 2014).

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Miscellanea

Reviews

Steven L. Stephenson. 2013. *A Natural History of the Central Appalachians*. West Virginia University Press, Morgantown, WV. 260 pp. \$29.99 (soft cover).

Those of us who belong to a natural history society are naturalists and as naturalists we have broad interests in the world around us. This book takes a broad look at a specific region which happens to be where many of us reside, work, and do our research. The Central Appalachians are defined by the author by latitude and longitude and include parts of Virginia, West Virginia, Maryland, and Pennsylvania. The 14 chapters include topics on the geology and palaeofauna of the region, its plants, fungi, and animals. The author is a botanist and a mycologist so it is not surprising that five chapters are devoted to "plants" in a broad sense and another to fungi. Invertebrates are under-represented with a chapter each on insects and another on non-insect invertebrates. The vertebrates of the region are covered in two chapters. Although humans are only very recent inhabitants of the Central Appalachians, their history and effects on the environment are an important part of the story.

The book is visually delightful with more than 130 color photos (I counted them). Many of them are of iconic organisms or environments representative of the Central Appalachians. In addition to the usual forest types, some unusual non-forested environments such as bogs, shale barrens, and grass balds are discussed. There are a few typos and the amphibian and reptile nomenclature is out of date but the book is authoritative and a pleasant read. Readers who are specialists in a particular taxon or ecological area may not learn much about their specialty, but the book is so broad in scope that there is much that can be learned and appreciated. A glossary of common and scientific names and suggestions for further reading will be useful for the amateur naturalist and the professional biologist.

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Reports

1. President's Report

The Executive Committee of the VNHS met on December 6, 2014 at Hampden-Sydney College. The committee approved a measure to provide a limited number of free memberships to college and university students who are nominated by VNHS members. Guidelines are provided below. We also proposed to create a special section of *Banisteria* for the publication of results from citizen science projects of Virginia Master Naturalist chapters.

Michael Lachance will replace me as President of the society in 2015. Richard Groover has completed his four-year term as Councilor. The committee thanks him for his service. He will continue to serve as the Editor of the society's newsletter for one more issue. Bill Shear will also be retiring from his position as Secretary-Treasurer in June 2015 and we are actively seeking a replacement for his position.

Student Membership Incentive

Recognizing that college and university students interested in natural history represent the main pool of prospective future members of the Virginia Natural History Society, the Executive Committee of the Society is soliciting nominations from our members for a free one-year membership in the Society to selected students. We believe that receiving this membership will make more students aware of the Society and appreciate the benefits of continued membership. The Society will fund up to twenty students in 2015. Nominees should be undergraduate or graduate students at a college or university in Virginia who are particularly interested in natural history. Nominators should be members of the Society and provide the following information for up to three students: Name, institution, mailing address, e-mail address, and a short paragraph describing the students' interests in and activities related to Virginia natural history. Nominations should be sent to the Secretary-Treasurer, William Shear (wshear@hsc.edu).

Respectfully submitted
Todd Fredericksen, President
Virginia Natural History Society

2. Minutes of the Council of the Virginia Natural History Society Meeting of December 6, 2014

The 2014 meeting of the Executive Committee of the Virginia Natural History Society was called to order by President Todd Fredericksen at 1:00 PM on December 6, 2014, in Settle Hall at Hampden-Sydney College, Hampden-Sydney, Virginia. In attendance were Ralph Eckerlin, Bill Shear, Steve Roble, Todd Fredericksen, Barry Knisley, Richard Groover, Nancy Moncrief, and Michael Lachance.

The minutes of the 2013 meeting and the report of the Secretary-Treasurer were approved unanimously. A current report is appended to these minutes. Bill Shear noted that he is retiring from Hampden-Sydney College in June, 2015, and does not plan to serve as Secretary-Treasurer of the society after that date.

Steve Roble presented the Editor's report. *Banisteria* No. 44, for autumn 2014, is expected to be published some time in February or March, 2015. Number 45 has a number of manuscripts currently in review and some additional contributions are expected. Number 46 is slated to contain 20 or more papers on moths and will be written predominantly by Roble and coauthors. Editor Roble reminded the council that he has now served for 15 years, and that there was at present no successor in line should he retire or otherwise be unable to continue as editor. He anticipates continuing as editor for about 2-3 years. The scanning of past *Banisteria* issues for posting online appears to be going well, and members of the council will receive scanned articles to proofread. There was a brief discussion of indexing services for *Banisteria*, but the council concluded that such services would confer no advantage.

Todd Fredericksen presented the President's report. He is in the process of forming connections with the Virginia Master Naturalists, and mentioned the possibility of joint projects with Master Naturalists resulting in reports for publication in *Banisteria*. He agreed to draft a proposal. There was some discussion of the possibility of a meeting of the general membership at some time in 2015, possibly in conjunction with one of the four regional chapters of the Master Naturalists, but no conclusion was reached.

The nominating committee reported on nominations for Vice President/President-elect, a position currently vacant. Alfred Gardner, curator of mammals at the Smithsonian Institution, was nominated by Ralph Eckerlin. Nominated for the two available council seats were Carla Dove, Paul Marek, and Chris Milensky; the longer term would go to the nominee with the most votes. President Fredericksen will prepare a ballot to go out with the next issue of *Banisteria*.

Ralph Eckerlin completed work on a revision of the bylaws. He made copies of his proposals available to the members of the council. The Virginia Academy of Science (VAS) has again invited VNHS members to present at its 2015 meeting without the need to be a VAS member. Council members agreed to ask Eckerlin to send a call for titles to Secretary Shear to be disseminated electronically.

There followed the perennial discussion of increasing the membership. It was suggested that college and university faculty members could nominate up to 3 students (maximum of 20 total annually) for free membership in the society, subject to a letter of recommendation and a vote of the council. This was moved by Groover and seconded by Knisley. President Fredericksen will draft a summary for members to review.

Richard Groover reported that he needed help with content for the newsletter and that he would circulate an unformatted version to the council next time, to facilitate editorial changes. He also appealed for help in preparing the newsletter. He updated the council on the following: the Virginia Academy of Science will hold a symposium on May 21, 2015, on the state of Virginia's environment. The fee for attendance is \$25, which includes a box lunch and free copy of the proceedings.

The meeting adjourned at 3:45 PM.

Respectfully submitted,
William A. Shear, Secretary/Treasurer

3. Secretary-Treasurer's Report, December 2014

As of December 5, 2014, the society had 127 members, including 14 institutions. This represents an increase in membership from December, 2013 (109 members, 17 institutions). In April, 2014, we had 78 members and 8 institutions. This year represents the greatest number of members since the most recent high point in 2004, when we enrolled 165 members, including 22 institutions. The increase may be due to more aggressive notification of lapsed members by the Secretary-Treasurer. We send out periodic email notices to members who have not yet renewed, in addition to including a renewal slip in the appropriate number of *Banisteria*.

Our current bank balance is \$9,611.54, down from \$9,968.42 from six months ago. Major fluctuations in the balance are usually due to the timing of the publication of *Banisteria*. We expect to receive a check for \$1,000 from the Virginia Museum of Natural History, which represents the damage deposit made for

the last meeting we held there, and which was never recovered.

Respectfully submitted,
William A. Shear, Secretary/Treasurer

4. Editor's Report

Tom McAvoy recently finished scanning all past *Banisteria* articles through issue number 14. After each article has been proofread and corrected (as needed), it will be posted on the society's website as a free downloadable pdf file. When this process is completed, all issues of *Banisteria* from 1992 to 2011 will be available on the website. I thank Tom and the numerous proofreaders for their efforts.

This issue of *Banisteria* was much delayed for a variety of reasons. Although it is a bit slim, the total number of pages published this year (133) is right at the average for the past 15 years (132). I am currently working on both 2015 issues of the journal and hope to have the first issue ready for printing by mid-summer. More manuscripts are desired for the second issue of 2015 and still more are needed for publication in 2016.

Banisteria was established for the purpose of disseminating scientific information on all aspects of natural history in the Commonwealth of Virginia, including botany, zoology, ecology, archeology, anthropology, paleontology, geology, geography, and climatology. The journal is suitable for manuscripts derived from natural history observations, small-scale field projects, distribution surveys and reviews, species inventories, reports for contracted environmental projects, and unpublished theses pertaining to Virginia natural history. The journal also is an appropriate outlet for papers on the history of natural history in Virginia or biographical material on naturalists who have worked in the Commonwealth. Papers focusing largely on studies conducted in adjacent states will be considered if there is a strong connection to Virginia natural history. Papers may be full length or shorter contributions, and we are always looking for book reviews. There are no page charges (unless color figures are desired) if the sole or first author is a

member of the Virginia Natural History Society. Authors are not required to be members of the VNHS to submit manuscripts (page charges are only \$20 per page). I will be happy to assist authors in the preparation of their manuscripts. The society's philosophy is that we would rather help get natural history information published for others to use than to have it remain on the shelf or in someone's desk.

Respectfully submitted,
Steve Roble, Editor, *Banisteria*

Announcements

1. Dr. Judith Winston, Curator of Marine Biology at the Virginia Museum of Natural History, retired in May 2014 after more than 21 years in that position. Judy served the Virginia Natural History Society in the roles of Councilor, Vice President, President (2005-2006), and Past-President over a period spanning 17 years. Dr. Winston is now a Smithsonian Institution Research Associate at their marine lab in Fort Pierce, Florida, where she is continuing her studies of bryozoan taxonomy. We congratulate Judy on her retirement and wish her well.

2. The society is seeking a volunteer to succeed Richard Groover as the newsletter editor. The newsletter is intended to appear semiannually between the issues of *Banisteria*. It is distributed electronically via email. If you are interested in this position please contact Michael Lachance (lachance@vt.edu).

3. An election ballot is enclosed with this issue of *Banisteria*. Please cast your vote for Vice President (= President-Elect) and 2 councilor positions.

4. If you have not yet renewed your membership for 2015 (*Banisteria* numbers 45 and 46), please consider doing so now. Also, try to recruit at least one new member to our society. Faculty members are encouraged to nominate up to 3 students for a free one-year membership in the society following the guidelines presented in the President's Report above.

Virginia Natural History Society

<http://virginiannaturalhistorysociety.com/>

General Information

The Virginia Natural History Society (VNHS) was formed in 1992 to bring together persons interested in the natural history of the Commonwealth of Virginia. The VNHS defines natural history in a broad sense, from the study of plants, animals, and other organisms to the geology and ecology of the state, to the natural history of the native people who inhabit it. The goals of the VNHS are to promote research on the natural history of Virginia, educate the citizens of the Commonwealth on natural history topics, and to encourage the conservation of natural resources.

Dissemination of natural history information occurs through publication of the journal *Banisteria*, named for John Banister (1650-1692) who was the first university-trained naturalist to work in Virginia. The first issue was published in 1992, and the journal is published twice per year in spring and fall. Articles cover a wide array of subjects, and prospective authors are encouraged to submit manuscripts on any aspect of natural history in Virginia; papers may pertain to Virginia or regional archaeology, anthropology, botany, ecology, zoology, paleontology, geology, geography, or climatology. Book reviews, biographies, obituaries, and historical accounts of relevance to natural history in Virginia also are welcomed. Manuscripts are peer-reviewed for suitability and edited for inclusion in the journal.

Page charges (\$20/page) are waived if the sole or first author is a VNHS member. All authors must pay \$75/page if they desire color printing of figures. The society's website contains detailed instructions for authors and the titles, abstracts or full PDF versions of articles from past *Banisteria* issues.

Memberships

The VNHS is open to anyone with an interest in natural history and welcomes participation by all members in society activities and efforts to promote education and conservation. Membership includes a subscription to *Banisteria* and invitations to periodic symposia and field events. Annual dues for members are \$20 (per calendar year); library subscriptions are \$40 per year. Checks or money orders (credit cards are not accepted) should be sent to the Secretary/Treasurer, who also has back issues of *Banisteria* available for sale. The VNHS is a tax-exempt, nonprofit, society under Section 501(C)3 of the IRS. We welcome donations to support our mission in Virginia.

Virginia Natural History Society

Application for Membership

Name _____

Address _____

Zip Code _____

Phone _____

Email _____

Area(s) of Interest _____

ANNUAL DUES AND SUBSCRIPTIONS TO *BANISTERIA*

(memberships and subscriptions are by calendar year; subscribers/members outside the United States should add \$3.00 for additional postage)

- ☐ \$500.00 Life (not annual)
- ☐ \$300.00 Benefactor
- ☐ \$100.00 Patron
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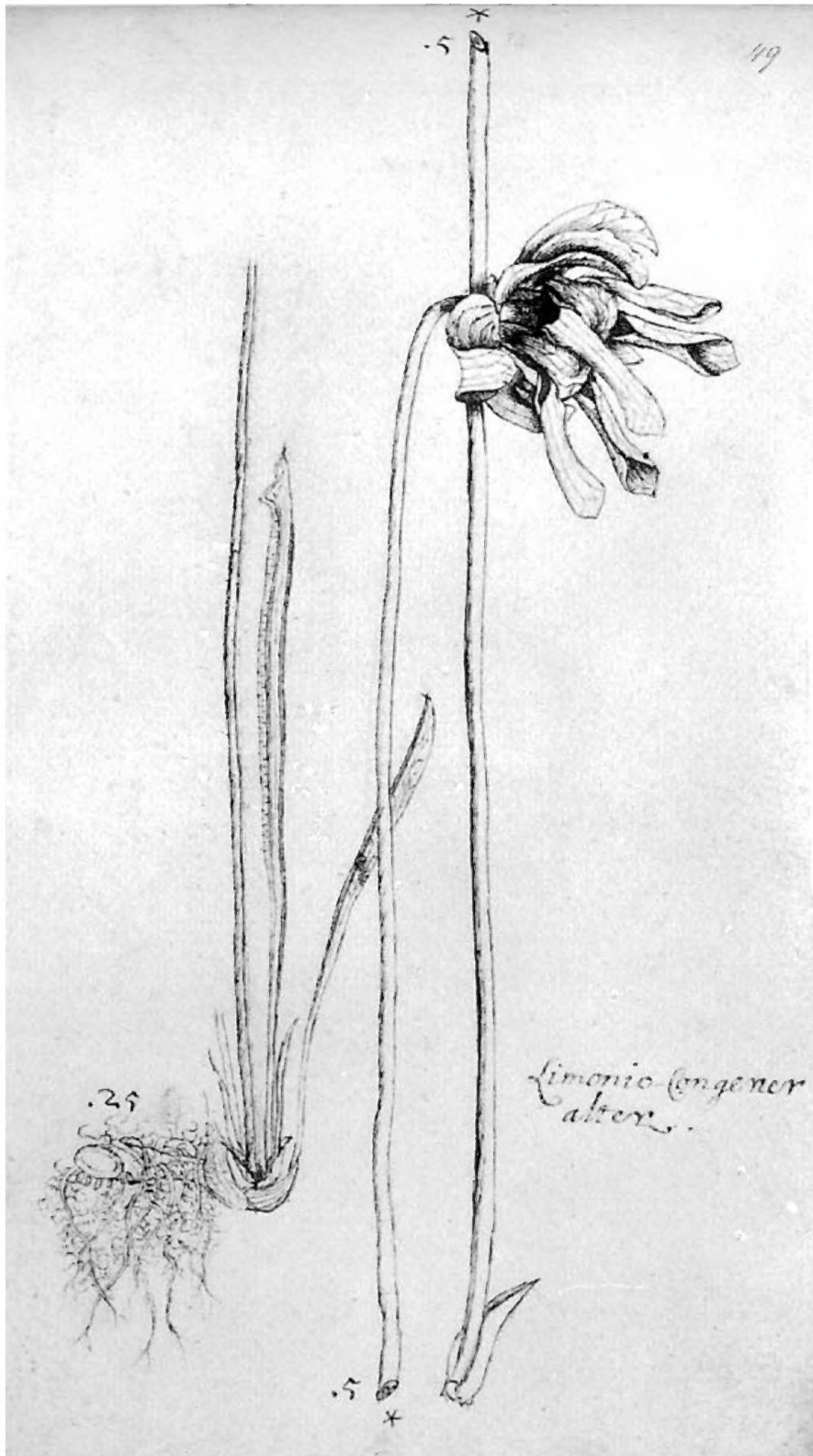
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Send membership form and dues to:
Dr. William Shear, Secretary-Treasurer
Virginia Natural History Society
Box 96
Hampden-Sydney, VA 23943



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